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Updated vegetation information in high resolution WRF simulations

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Abstract Climate studies show that the frequency of heat wave events and above-average high temperatures during the summer months over Europe will increase in the coming decades. Such climatic changes and long-term meteorological conditions will impact the seasonal development of vegetation and ultimately modify the energy distribution at the land surface. In weather and climate models it is important to represent the vegetation variability accurately to obtain reliable results. The weather research and forecasting (WRF) model uses green vegetation fraction (GVF) time series to represent vegetation seasonality. The GVF of each grid cell is additionally used to scale other parameters such as LAI, roughness, emissivity and albedo within predefined intervals. However, the default GVF used by WRF does not reflect recent climatic changes or change in management practices since it was derived more than 20 years ago. In this study, a new high resolution GVF product based on MODIS images is applied in a high resolution WRF simulation over Denmark during the 2006 heat wave year. It is found that the GVF is very different in a heat wave year compared to the default GVF. The simulation is compared to a control run using the default GVF data and their performances are quantified against gridded data. The verification includes 2-m temperature and precipitation. The results show that although the simulation using the new GVF product performs well, it does not significantly improve performance compared to the default GVF, despite significant differences in vegetation fractions.

Key words green vegetation fraction; WRF; heat wave